Claims

1. A process of separating suspended solids from a fermentation liquor by subjecting the liquor to a solids-liquid separation stage,
wherein the fermentation liquor is produced in a fermentation process for the production of a fermentation product,
in which the liquor has been subjected to a temperature of at least 50°C,
wherein the solids-liquid separation stage is assisted by a treatment system,
characterised in that the treatment system comprises an anionic polymer selected from natural polymers and modified natural polymers having an anionic charge such that the equivalent weight is below 300, and synthetic polymers formed from at least 50% by weight anionic monomer units.

2. A process according to claim 1 in which the fermentation liquor is subjected to a distillation stage in which the fermentation product is recovered, wherein the liquor is removed from the distillation stage as a stillage stream and then subjected to the solids-liquid separation stage.

3. A process according to any of claim 1 or claim 2 in which the treatment system comprises an anionic polymer formed from at least 65% by weight anionic monomer units.

4. A process according to any of claims 1 to 3 in which the anionic polymer is formed from anionic monomers selected from the group consisting of (meth) acrylic acid (or salts), maleic acid(or salts), itaconic acid(or salts), fumaric acid(or salts), vinyl sulfonic acid(or salts), allyl sulfonic acid and 2-acrylamido-2-methyl sulfonic acid(or salts).

5. A process according to any of claims 1 to 4 in which the anionic polymer exhibits an intrinsic viscosity of at least 4 dl/g (measured using a suspended level viscometer in 1M NaCl buffered to pH 7.5 at 25°C).

6. A process according to any of claims 1 to 6 in which the treatment system further comprises addition of a cationic polymer that exhibits an intrinsic viscosity below 4dl/g (measured using a number 1 suspended level viscometer in 1M NaCl buffered to pH 7.0 at 25°C).

7. A process according to claim 6 in which the cationic polymer exhibits a charge density of at least 3 meq/g.

8. A process according to claim 6 or claim 7 in which the cationic polymer is selected from the group consisting of polyamines, amine/epihalohydrin addition polymers, polymers of dicyandiamide with formaldehyde, polymers of diallyldimethyl ammonium chloride (DADMAC), cationic starch and cationic inulin, polymers of dialkyl amino alkyl (meth) acrylates (or salts) and dialkyl amino alkyl (meth) acrylamides (or salts).

9. A process according to any of claims 6 to 8 in which the anionic polymer and cationic polymer are added sequentially, preferably employing the anionic polymer first.

10. In a process according to any of claims 1 to 9 in which the dose of anionic polymer is at least 50 grams per tonne (based on dry weight of fermentation liquor).

11. A process according to any of claims 6 to 10 in which the dose of cationic polymer is at least 50 grams per tonne (based on dry weight of fermentation liquor).

12. A process according to any of claims 1 to 11 in which the treatment system further comprises addition of a siliceous material.

13. A process according to claim 12 in which the siliceous material is selected from the group consisting of silica based particles, silica microgels, colloidal silica, silica sols, silica gels, polysilicates, cationic silica, aluminosilicates, polyaluminosilicates, borosilicates, polyborosilicates, zeolites and swellable clays.

14. A process according to claim 12 or claim 13 in which the siliceous material is an anionic microparticulate material.

15. A process according to any of claims 12 to 14 in which the siliceous material is a bentonite type clay.

16. A process according to any of claims 12 to 15 in which the siliceous material is selected from the group consisting of hectorite, smectites,

montmorillonites, nontronites, saponite, sauconite, hormites, attapulgites and sepiolites.

17. A process according to any of claims 1 to 16 in which the fermentation liquor is subjected to a mechanical dewatering stage during or subsequent to application of the treatment system.

18. A process according to claim 17 in which the mechanical dewatering step is selected from the group consisting of a centrifuge, a screw press, a filter press, a belt filter press a horizontal belt filter, and a pressure filter.

19. A process according to any of claims 1 to 18 in which the treated liquor from which suspended solids have been removed are recycled and used as wash water.

20. A process according to any of claims 1 to 19 in which the fermentation liquor comprises lignin and in which the separated solids are dewatered and then subjected to a drying stage to provide a dry solid material and in which the dry solid material is used as a solid fuel.

21. A process according to any of claims 1 to 20 in which the fermentation liquor is derived from crop sugars and in which the separated solids are dewatered and then subjected to a drying stage to provide a dry solid material and in which the dry solid material is used as a solid fuel or as an animal feed.

22. A process according to any of claims 1 to 21 in which the fermentation product is selected from the group consisting of ethanol, glycerol, acetone, n-butanol, butanediol, isopropanol, butyric acid, methane, citric acid, fumaric acid, lactic acid, propionic acid, succinic acid, itaconic acid, acetic acid, acetaldehyde and 3-hydroxypropionic acid, glycolic acid, tartaric acid, and amino acids (such as L-glutamic acid, L-lysine, L-aspartic acid, L-tryptophan, L-arylglycines)or salts of any of these acids.